

AMENDMENTS TO THE CLAIMS

Claims 1-15 (Cancelled)

16. (Currently Amended) A flat-plate low-profile actuator, comprising:

- a planar conductive polymer layer extending in a longitudinal direction;
- a first electrode in contact with the planar conductive polymer layer;
- a second electrode disposed opposite to the first electrode; and
- an electrolyte layer in contact with the planar conductive polymer layer, disposed in between the first electrode and the second electrode;

wherein the first electrode is planar and comprises at least one band-like portion and at least one link portion, each of the at least one link portion extending in the longitudinal direction, each of the at least one band-like portion extending in a direction perpendicular to the longitudinal direction, and each of the at least one link portion is shorter than each of the ~~at least~~ ~~on~~ least one band-like portion; and

wherein application of an electric potential between the first electrode and the second electrode deforms the planar conductive polymer layer such that the flat-plate low-profile actuator expands or contracts in the longitudinal-direction; direction;

wherein the first electrode is a zigzag-shaped planar electrode.

17. (Cancelled)

18. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein the first electrode is a planar electrode, the at least one band-like portion is a plurality of band-like portions, the at least one link portion is a plurality of link portions, and the plurality of link portions connect adjacent pairs of the band-like portions.

19. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, further comprising planar extension portions disposed on two sides of the first electrode in the longitudinal direction, the planar extension portions being operable to transfer a force generated

in the flat-plate low-profile actuator.

20. (Previously Presented) The flat-plate low-profile actuator as defined in claim 19, wherein the planar conductive polymer layer is disposed on front and back surfaces of the first electrode, and a hole is disposed in each of the extension portions so as to link the front and back planar conductive polymer layers for reinforcement.

21. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein the first electrode and the second electrode are disposed on alternate sides of the flat-plate low-profile actuator.

22. (Currently Amended) The flat-plate low-profile actuator as defined in claim 16, wherein the first electrode is a thin plate having been subjected to a surface treatment. ~~treatment, or is a thin plate comprising a substance selected from a group consisting of carbon; gold; platinum; nickel; titanium; stainless steel; an alloy of gold; an alloy of platinum; an alloy of nickel; an alloy of titanium; and an alloy of stainless steel.~~

23. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein the planar conductive polymer layer is composed of a pi-conjugated polymer with a substrate comprising a substance selected from a group consisting of polyaniline, polypyrrole, polythiophene, a carbon dispersion conductive polymer, and an organic conductive polymer which is a derivative of polyaniline, polypyrrole, or polythiophene.

24. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein the electrolyte layer is a polymer gel or a polymer containing an ionic liquid.

25. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein a ratio of a thickness of the planar conductive polymer layer to a thickness of the first electrode is not more than 3.

26. (Currently Amended) A flat-plate low-profile actuator, comprising:

- a planar conductive polymer layer extending in a longitudinal direction;
- a first electrode in contact with the planar conductive polymer layer;
- a second electrode opposite to the first electrode; and
- an electrolyte layer in contact with the planar conductive polymer layer, disposed in between the first electrode and the second electrode,

wherein the first electrode is planar and comprises at least one link portion extending in the longitudinal direction;

wherein the first electrode is disposed such that the flat-plate low-profile actuator is less rigid in the longitudinal direction than a direction orthogonal to the longitudinal direction; and

wherein the application of an electric potential between the first electrode and the second electrode deforms the planar conductive polymer layer such that the flat-plate low-profile actuator expands or contracts in the longitudinal direction;

wherein the planar conductive polymer layer has a first side extending in the longitudinal direction and a second side extending in the longitudinal direction; wherein the first electrode comprises a plurality of band-like portions, wherein the at least one link portion is a plurality of link portions, wherein the plurality of link portions connect adjacent band-like portions, and wherein the plurality of link portions alternate between being disposed on the first side and the second side such that the band-like portions and the link portions cumulatively form a zig-zag pattern.

27 - 30. (Canceled)

31. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein the first electrode is disposed such that the flat-plate low-profile actuator is less rigid in the longitudinal direction than a direction orthogonal to the longitudinal direction.

32. (Currently Amended) ~~The flat-plate low-profile actuator as defined in claim 16,~~

A flat-plate low-profile actuator, comprising:

a planar conductive polymer layer extending in a longitudinal direction;

a first electrode in contact with the planar conductive polymer layer;

a second electrode disposed opposite to the first electrode; and

an electrolyte layer in contact with the planar conductive polymer layer, disposed in between the first electrode and the second electrode;

wherein the first electrode is planar and comprises at least one band-like portion and at least one link portion, each of the at least one link portion extending in the longitudinal direction, each of the at least one band-like portion extending in a direction perpendicular to the longitudinal direction, and each of the at least one link portion is shorter than each of the at least one band-like portion;

wherein application of an electric potential between the first electrode and the second electrode deforms the planar conductive polymer layer such that the flat-plate low-profile actuator expands or contracts in the longitudinal direction; and

wherein the planar conductive polymer layer has a first side extending in the longitudinal direction and a second side extending in the longitudinal direction; wherein the at least one band-like portion is a plurality of band-like portions, wherein the at least one link portion is a plurality of link portions, wherein the plurality of link portions connect adjacent band-like portions, and wherein the plurality of link portions alternate between being disposed on the first side and the second side such that the band-like portions and the link portions cumulatively form a zig-zag pattern.

33. (Cancelled)

34. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein the first electrode is a linear electrode.

35. (Previously Presented) The flat-plate low-profile actuator as defined in claim 16, wherein the first electrode comprises a plurality of interconnected linear electrode elements.

36. (Previously Presented) The flat-plate low-profile actuator as defined in claim 26, wherein the first electrode comprises a plurality of interconnected linear electrode elements.

37. (Currently Amended) The flat-plate low-profile actuator as defined in claim 26, wherein the first electrode is a thin plate having been subjected to a surface treatment, or is a thin plate comprising a substance selected from a group consisting of carbon; gold; platinum; nickel; titanium; stainless steel; an alloy of gold; an alloy of platinum; an alloy of nickel; an alloy of titanium; and an alloy of stainless steel.

38. (Previously Presented) The flat-plate low-profile actuator as defined in claim 26, wherein the planar conductive polymer layer is composed of a pi-conjugated polymer with a substrate comprising a substance selected from a group consisting of polyaniline, polypyrrole, polythiophene, a carbon dispersion conductive polymer, and an organic conductive polymer which is a derivative of polyaniline, polypyrrole, or polythiophene.

39. (Cancelled)

40. (New) The flat-plate low-profile actuator as defined in claim 16, wherein the first electrode is a thin plate comprising a substance selected from a group consisting of carbon, gold, platinum, nickel, titanium, stainless steel, an alloy of gold, an alloy of platinum, an alloy of nickel, an alloy of titanium, and an alloy of stainless steel.

41. (New) The flat-plate low-profile actuator as defined in claim 26, wherein the first electrode is a thin plate comprising a substance selected from a group consisting of carbon, gold, platinum, nickel, titanium, stainless steel, an alloy of gold, an alloy of platinum, an alloy of nickel, an alloy of titanium, and an alloy of stainless steel.